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ABSTRACT

Discourse can be organized in many different ways, two of these being comparison and a collection of descriptions. These two discourse types correspond to schemata that vary in their organizational components, and these differences can be expected to produce differences in the processing of text. For example, research has shown that for young adults of high verbal ability, the more organized discourse type--comparison--yields better recall of information than does the less organized type--collection--for descriptions of a topic. A study was conducted to explore the view that the learning of information from discourse can be enhanced by matching its organization to the learner's prevalent learning strategy. The subjects, 40 young, 38 middle aged, and 40 old adults, completed a demographic survey, health questionnaire, survey of reading habits, and the Quick Word Test. Scores on the word test indicated that approximately half the subjects in each age group were high verbal and half were average verbal. Subjects read especially constructed passages with different discourse structures and responded to recall questions. Results showed that the comparison structure yielded superior recall for all age groups. No interaction was found, however, among discourse type, age, and verbal ability. (Passages used in the study are included in the text.) (FL)

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Effects of Discourse Type on Recall by Young, Middle, and Old Adults with High and Average Vocabulary Scores

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Abstract

Discourse can be organized in different ways: two of these ways are comparison and a collection of descriptions. These two discourse types correspond to schemata that vary in their organizational components; these differences are expected to result in differences in processing texts. For young adults of high verbal ability, the more organized discourse type, comparison, has been shown to yield superior recall of information than the less organized type, collection, for descriptions about a topic (Meyer & Freedle, in press). In the present investigation, we expected differential facilitation of the two discourse types by different groups of subjects varying in age and vocabulary performance. For example, the old adults with average vocabulary scores were expected to have difficulty utilizing the comparison organization, but have ready access to the descriptive, list-like organization which more closely matches a more frequently used learning strategy for this population. Thus, the study explored a view that learning of information from discourse can be facilitated by matching its organization to the learner's prevalent learning strategy. The data supported the findings of Meyer and Freedle (in press) in that the comparison structure yielded superior recall. However, we did not find the expected interaction of discourse type, age, and verbal ability. Sampling problems occurred with the vocabulary test used to screen the subjects; instead of high verbal and average verbal groups of subjects, we ran extremely high and high average groups of subjects. Currently, we are attempting to run average verbal adults.

In addition, the results showed age effects in recall. Research with these same subjects under different task conditions yielded no age effects in recall, but longer reading times for older adults. The age effects in the current study for both recall and factual questions may have resulted from the listening task that controlled presentation time for all age groups.

Effects of Discourse Type on Recall by Young, Middle, and Old Adults with High and Average Vocabulary Scores

Discourse can be organized in different ways. Meyer and Freedle (in press) specified different types of expository text, the organizational components of these types, and recall data on their memorability. From this study with graduate students, recall varied most between the discourse types of comparison and a collection of descriptions. The present investigation examines recall from these two discourse types by young, middle, and old adults with high and average scores on vocabulary tests.

The comparative structure provides more organizational components than a collection of descriptions. The comparison organizes on the basis of similarities and differences; the ideas contrasted deal with many of the same issues from different perspectives. Thus, there is overlap between the ideas and structures organized in a comparison. For example, the text on the topic of whales used by Meyer and Freedle (in press) compares two different claims about whales (friendly vs. dangerous) from two groups (scientists vs. seamen) with two different sources of information (experiments vs. tales).

In contrast, a collection of descriptions groups ideas in text together on the basis of association. A description gives more information about a topic by presenting an attribute, specific, or setting. A collection of descriptions groups such descriptions about a topic together. For example, in the text on whales organized

as a collection of descriptions, three attributes of whales are presented and discussed: friendliness toward humans, mutual cooperation among whales, and unusual physical traits.

Both the comparison and collection of descriptions structures group ideas on the basis of association rather than causation as do the structures of causation and problem/solution (see Meyer & Freedle, in press). The description is a specific type of grouping by association in that one element of the association is subordinate to another. The collection of descriptions structure groups these subordinates together under a topic. The comparison structure also groups ideas about a topic, but contains more structure than solely association. The number of additional organizational components increases according to the number of matching relationship structures and issues covered. In order to be classified as a comparison structure, at least one overlapping structure must be found. In the whale example, overlap occurs in the structures for viewing the topic: a group asserts a claim about the topic with some rationale; here three matching structures are found: group, claim, and rationale.

Figure 1 (from Meyer & Freedle, in press) presents the model of learning and memory for discourse that underlies this investigation. Young, middle-aged, and old adults with high vocabulary test scores

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Insert Figure 1 about here

(high verbal) were expected to select the schema from memory which best matched the encountered discourse and to use this schema as the overall structure for processing it. The comparison schema has more organizational components or more slots to be filled than the collection/description structure. These additional organizational components were expected to facilitate encoding, economy of storage in memory, and subsequent retrieval processes. For example, at the time of recall, remembering that a discourse was presented in a comparison provides more retrieval cues than remembering the discourse stated a list of descriptions about a topic. The comparison schema provides a more systematic search of memory: one topic is viewed differently by two groups for specific reasons that discuss many of the same issues. The comparison structure yielded superior immediate and delayed recall and delayed responses to questions over the collection/description structure for graduate students in the Meyer and Freedle (in press) study.

In contrast, the middle-aged and old adults with average vocabulary scores run in this study were expected to perform better on the versions organized as a collection of descriptions rather than a comparison. They were expected to have difficulty utilizing the comparison organization, but have ready access to the descriptive, list-like organization that more closely matches a more frequently used learning strategy for this population. Our past work (Meyer & Rice, 1983) showed that average verbal old adults had much more difficulty figuring out the logical relations in discourse than average verbal young adults or high verbal young and old adults.

Flower (1979), a rhetorician, also has considered these two different ways to organize discourse. She suggests that the descriptive structure is a more natural, though less efficient, form of verbal production. It is possible that average verbal older adults have fallen out of the habit of using comparative structures, while still utilizing list-like strategies (e.g., shopping lists) in their everyday lives.

We predicted that young adults with average verbal skills would perform better on the comparative structures due to frequency of the use of these structures in school, while this would not be the case for the older groups with average verbal skills whose everyday activities involved much more listing than comparing. The average verbal middle-aged and old adults were expected to fall into the "no" categories in the model (Figure 1) at either "Do you expect to find organization among propositions?" or "Have you mastered all the organizational components of the schema?"

Thus, a significant interaction was expected between discourse type, age, and verbal ability. That is, for young adults there will be no interaction between discourse type and verbal ability, but there will be a significant interaction between discourse type and verbal ability for old adults.

This interaction of discourse type, age, and verbal ability has been suggested by past pilot studies and dissertations conducted at Arizona State University. As shown in Table 1, the comparative

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Insert Table 1 about here

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structure has yielded superior recall for high average verbal young (Meyer & Freedle, in press), middle, and old adults (Meyer, Rice, Knight, & Jessen, 1979), proficient readers in the ninth-grade (Brandt, 1978), and proficient sixth-grade readers after two readings (Elliott, 1980). However, the collection of descriptions yielded superior recall for low verbal old adults (Meyer & Walker, 1978), average verbal old adults (Ellis, 1982), and poor readers at the ninth-grade level (Brandt, 1978). No differences between recall from the two discourse types were found after one reading by proficient sixth-grade readers nor by young, middle, and old adults with high average vocabulary performance when they were given unlimited reading time and practice on a similar passage. In addition, Ellis found no discourse type effects for old adults with damage to either their left or right cerebral hemisphere. Those with damage to the right hemisphere could use the comparison structure to organize their protocols, but apparently had not mastered the components of this schema sufficiently to benefit from its superior organization. However, those with damage to the left hemisphere, known for deficiencies in processing verbal information, organized their recall protocols from both the comparative and descriptive texts as a collection of descriptions; they were either unaware of or unable to utilize the comparison structure presented in the original text.

Our aim in the present investigation was to include the major age and ability factors listed in Table 1 in one study. Young, middle, and old adults listened to the dehydration and whale passages adapted

from Meyer and Freedle (in press). Listening was chosen over reading as the mode of presentation in order to control and equate exposure time. For each age group, we sought to have subgroups of high and average performers on vocabulary tests.

Method

Subjects. One hundred and eighteen adults participated in the experiment. Prospective subjects responded to calls for subjects in the newspaper, campus fliers, and meetings of clubs or churches. They were administered a demographic survey, health questionnaire, survey of reading habits, and the Quick Word Test (Borgatta & Corsini, 1964, a 100-item self-paced vocabulary test). Subjects falling in the desired age and vocabulary ranges were requested to participate in the study. They were each paid $5.00.

Forty young, 38 middle-aged, and 40 old adults participated in the study; 20 in each age group scored above 52 on the Quick Word Test and were designated as high verbal, while half of the subjects in each age group (18 in the middle-aged sample) scored below 52 and were labeled average verbal. Most of the subjects also were individually administered the Vocabulary Subtest of the Weschler Adult Intelligence Scale (WAIS). The correlation between the Quick and the WAIS vocabulary tests is .83 for groups of young and old adults (see Meyer & Rice, 1983). Table 2 describes the age and vocabulary scores of the different groups of subjects who participated in this study.

Insert Table 2 about here

Materials. The passages used were taken from Meyer and Freedle (in press). These passages are on the topics of dehydration and whales with different versions organized as a comparison and a collection of descriptions. The dehydration passages were lengthened and signaling of the organization was added as an introductory sentence in order to match the length and style of the passages on whales. The term killer whale used in Meyer and Freedle (in press) was changed to its scientific term, grampus whale. Details on the construction and differences between the discourse types of comparison and collection/description can be found in Meyer and Freedle (in press).

In order to control for the structure and content of information while investigating the effect of the discourse type on memory from prose, the two versions on each topic were written with identical information and structure except for overall discourse structure and a minimal number of ideas necessary for altering this structure. The content structures of the two versions on dehydration were identical for 81 idea units (41 units in the first paragraph and 40 units in the last paragraph). The two versions differed on 13 idea units. The content structures of the two versions on whales were identical for 81 idea units (41 units in the first paragraph and 40 units in the last paragraph). The two versions differed on 14 idea units. All four passages contained 184 words each; 140 were the same and 44 were different (10 different words in the introductory sentence and 34 as a paragraph transition). The Dale-Chall readability formula places all four passages at the 13-15 grade level.

The following presents the four passages used in the experiment. The different information is capitalized, while the identical information is in lowercase letters. The capitalized and underlined words in the text identify the different ideas in the passages. The capitalized words without underlining explicitly signal (Meyer, 1975) the discourse type of the passage.

Topic: Dehydration

Discourse Type: Comparison

OPINIONS ON BODY WATER LOSS DIFFER BETWEEN COACHES AND DOCTORS. The loss of body water is frequently required by athletic coaches of wrestlers, boxers, judo contestants, karate contestants, weight lifters, and members of 150 pound football teams so that they will attain specified body weights. These specified weights are considerably below the athletes' usual weights. This requirement allows the athletes to compete in lower weight classes. In these lower weight classes they have an advantage in both size and strength.

IN CONTRAST TO THE ACTION TAKEN BY COACHES, THE AMERICAN MEDICAL ASSOCIATION IN A 1975 RESOLUTION STRONGLY CONDEMNED LOSS OF BODY WATER FOR ATHLETES. THEY CONDEMN THIS PRACTICE DUE TO THE FACT THAT THE loss of water from the body can impair cardio-vascular functioning. Specifically, a loss of three percent of body water impairs physical performance and a loss of five percent results in heat exhaustion, faintness, and nausea.

Moreover, a loss of seven percent of body water causes hallucinations. Losses of ten percent or more of body water result in heatstroke, deep coma, and convulsions; if not treated, then death will result.

Topic: Dehydration

Discourse Type: Collection of Descriptions

THIS PRESENTATION DESCRIBES SEVERAL ASPECTS OF BODY WATER LOSS. FIRST, the loss of body water is frequently required by athletic coaches of wrestlers, boxers, judo contestants, karate contestants, weight lifters and members of 150 pound football teams so that they will attain specified body weights. These specified weights are considerably below the athletes' usual weight classes. In these lower weight classes they have an advantage in both size and strength.

A SECOND ASPECT OF LOSS OF BODY WATER IS THAT UNDER ORDINARY CIRCUMSTANCES AN INDIVIDUAL WHO WEIGHS 200 POUNDS LOSES A TOTAL OF FOUR PINTS OF WATER OVER THE COURSE OF EACH DAY.

THIRD, loss of water from the body can impair cardio-vascular functioning. Specifically, a loss of three percent of body water impairs physical performance and a loss of five percent results in heat exhaustion, faintness, and nausea. Moreover, a loss of seven percent of body water causes hallucinations. Losses of ten

percent or more of body water results in heatstroke, deep coma, and convulsions; if not treated, then death will result.

Topic: Whales

Discourse Type: Comparison

SCIENTISTS AND SEAMEN CLASH ON THEIR VIEWS ABOUT GRAMPUS WHALES. In recent years scientists conducting aquatic research have shown that grampus whales exhibit friendly behavior toward humans. According to Jacques Cousteau's reports, in their natural habitat grampus whales have not attacked boats pursuing them nor scuba divers. In captivity they love to be petted by their trainers. In fact, petting, rather than providing edible rewards, is the best way to train them due to their sensitive skin and social needs.

IN CONTRAST TO THE FINDINGS OF SCIENTISTS, FOR CENTURIES TALES OF SEAMEN HAVE ALWAYS RATED GRAMPUS WHALES AS THE MOST DANGEROUS CREATURES. THIS DREADFUL REPUTATION HAS BEEN FOSTERED BY UNUSUAL ATTRIBUTES OF GRAMPUS WHALES. The grampus whales reach thirty feet in length and they weigh four tons. Grampus whales are strikingly patterned with black and white. Their dorsal fin extends to a height of six feet and is triangular in shape. The jaws of a grampus whale bear twenty-four enormous teeth. They can swim at speeds of thirty-five miles per hour. In

addition, grampus whales can dive to depths of 1000 feet.

Topic: Whales

Discourse Type: Collection of Descriptions

GRAMPUS WHALES ARE FRIENDLY, MUTUALLY COOPERATIVE AND PHYSICALLY UNUSUAL. FIRST, in recent years scientists conducting aquatic research have shown that grampus whales exhibit friendly behavior toward humans. According to Jacques Cousteau's reports, in their natural habitat grampus whales have not attached boats pursuing them nor scuba divers. In captivity they love to be petted by their trainers. In fact, petting, rather than providing edible rewards, is the best way to train them due to their sensitive skin and social needs.

SECOND, GRAMPUS WHALES COOPERATE WITH EACH OTHER. THEY LIVE TOGETHER IN GROUPS OF FIFTEEN. FURTHERMORE, GRAMPUS WHALES ARE ALSO DOTING PARENTS.

IN ADDITION, THE GRAMPUS WHALES EXHIBIT A VARIETY OF ATTRIBUTES WHICH ARE UNUSUAL. The grampus whales reach thirty feet in length and they weigh four tons. Grampus whales are strikingly patterned with black and white. Their dorsal fin extends to a height of six feet and is triangular in shape. The jaws of a grampus whale bear twenty-four enormous teeth. They can swim at speeds of thirty-five miles per hour. In addition, grampus whales can dive to depths of 1000 feet.

Factual questions were written to probe memory of the identical information in each version on a topic. Seven questions tapped identical information in the first paragraphs of the passages and seven questions tapped information in the last paragraphs. These questions required one or two-word answers. The questions and their answers include the following:

What is the advantage of competing in a lower weight class?

[1 point given for strength (stronger) or for size (larger)]

What percentage of body water loss results in hallucinations?

(7%)

What is the best way to train grampus whales? (petting)

How many teeth do they have? (24)

Procedure. Subjects were grouped according to age and vocabulary scores and then a stratified random sampling procedure was used to assign the subjects to the two groups. One group listened to two comparison passages and the other listened to two collection/description passages. The order in which the two topics, dehydration and whales, were read was counterbalanced. The passages were recorded in a man's voice at the rate of 120 words per minute. (This rate was equivalent to the slow presentation rate in Cohen, 1979.) Each passage was 90 seconds in duration.

The subjects had on another occasion participated in a reading and recall task, and thus, they were familiar with the general procedure. After listening to each passage, a written free recall test was administered. The subjects were asked to write down everything they could remember from the passage using their own

words or words from the passage. They were asked to recall it in sentence form, rather than list ideas remembered. If they could recall one idea, but not how it related to the other information in the passage, they were to state this and not simply list in isolation the word remembered.

After listening to and recalling both topics, the subjects answered the questions. The order in which they answered questions on a topic corresponded to the order in which they heard the topic.

After the listening study, the middle and old subjects and some of the younger ones were administered the Vocabulary Subtest of the WAIS. The older subjects also were interviewed individually about reading and memory strategies.

Scoring. A recall protocol from a particular passage was scored with the aid of the passage's content structure. The protocol was scored for the presence and absence of 81 identical idea units in the content structures. Detailed information on the scoring procedure and reliability can be found in Meyer (1975, in press). Twenty-five free recall protocols were scored by Meyer and a graduate student to check for reliability; the correlation was .975.

Each recall protocol was classified according to the discourse type used by the subject to organize the protocol. The scorer diagrammed the top levels of the content structure for the protocol and then classified it. The classifications were the same structure in the protocol as the discourse type of the original passage or a discourse type different from that of the passage listened to by the subject and a specification of this different structure. Of the 25

protocols scored for the reliability check, the scorers agreed on the classification of 23 of the structures of these protocols. Further descriptions of this classification system and examples of protocols scored with this system can be found in Meyer and Freedle (in press).

One point was given for each correct answer to the 14 questions written to tap the same information from each version on a topic. Seven points came from the first paragraph of each text and seven from the last paragraph. The short answers were usually verbatim from the passage although only the correct meaning was required to receive one point.

Results and Discussion

Discourse type effects. Recall frequency data on the 81 identical idea units for each version on a topic were analyzed with a four-factor analysis of variance (Discourse Type x Verbal Ability x Age x Passage Topic) with repeated measures on passage topic. The main effects of discourse type ($F_{1, 106} = 6.86$, $p < .01$), verbal ability ($F_{1, 106} = 86.57$, $p < .0000$), and age ($F_{2, 106} = 24.22$, $p < .0000$) were statistically significant. Table 3 presents the mean recall scores and standard deviations for the age and verbal ability groups on each version of the dehydration and whales passages. Passage topic was not statistically significant ($F_{1, 106} = .23$), but it did interact with verbal ability ($F_{1, 106} = 4.70$, $p < .03$) as

Insert Table 3 about here

well as age ($F_{2, 106} = 3.52$, $p < .03$). All other interactions, including the expected discourse type x age x verbal ability interaction ($F_{2, 106} = .66$), were not significant.

The data showed no support for the differential effect expected for the different types of discourse and kinds of learners. Instead, the comparative structure yielded superior recall for all learners; the overall mean for the comparison versions was 42.53, while it was 38.53 for the collection of descriptions.

The number of questions answered correctly from the first and last paragraphs of the passages were analyzed with a six-factor analysis of variance (Discourse Type x Verbal Ability x Age x Presentation Order x Passage Topic x Paragraph Location of Questions) with repeated measures on passage topic and paragraph. Discourse type was not significant ($F_{1, 94} = 1.00$), but it interacted significantly with passage topic and age ($F_{2, 94} = 3.38$, $p < .04$). The young adults performed better on the questions when they had read the comparison versions of both topics. The middle-aged adults performed better on the comparison version of whales, but not for dehydration. Results from the old adults were the opposite: the comparison version was superior for dehydration and the collection of descriptions was superior for whales. The significant main effects were verbal ability ($F_{1, 94} = 48.32$, $p < .0000$), age ($F_{2, 94} = 22.51$, $p < .0000$), passage ($F_{1, 94} = 46.12$, $p < .0000$), and paragraph ($F_{1, 94} = 36.30$, $p < .0000$). Also, significant were the interactions between verbal ability and paragraph ($F_{1, 94} = 9.91$, $p < .002$) and between passage and paragraph ($F_{1, 94} = 47.00$, $p < .0000$).

Basically, these passage and paragraph effects reflect the poorer performance on the questions from the last paragraph of the dehydration passage ($\bar{X}$ = 2.72) in contrast to the other questions (4.14, 4.14, 4.34 for the first paragraph from dehydration, the first paragraph from whales, and whales' last paragraph, respectively). This last paragraph on dehydration contains a list of percentages of water loss and their effects; there was confusion as to what percentage went with what effect in the recall data. We tallied the number of confusions in recall and found them more frequent for the dehydration texts than the whale texts ($F_{1, 106} = 58.69$, $p < .0000$; dehydration = 1.08, whales = .29). Thus, when subjects were required to accurately match the percentage of water loss with its physical outcome, there were many errors on these questions.

In order to better understand the findings, we will examine each age group separately. The findings for the young adults are as predicted; the comparison structure ($\bar{X}$ = 51) facilitated recall over the collection of descriptions ($\bar{X}$ = 45). The proportion of idea units recalled by the average verbal young adults for the two discourse types (comparison = .57 and collection/descriptions = .47) exactly matches their recall by Meyer and Freedle's (in press) young adults who scored at the 77 percentile of the Vocabulary Subtest of the Nelsen-Denny Reading Test. In examining the WAIS vocabulary scores of our high and average subjects, it becomes apparent that we have added a super high group as our new sample and replicated past research (see Tables 1 and 2) with the average sample. The average group in our study is actually high average and equivalent in performance to past studies with graduate students.

Seventy-four of the recall protocols written by the young adults used the same top-level structure as found in the original text. Of the six protocols with different structures, three average verbal adults used a collection of descriptions after hearing a comparative version of the whale passage, and two high verbal and one average verbal subjects used a comparison structure after hearing the descriptive version of the dehydration passage. Thus, most (93%) of the young adults appear to be following the structure strategy (yes responses in the flowchart) modeled in Figure 1. The data on recall and use of structure from the young adults replicate the findings of Meyer and Freedle (in press).

Eighty-eight percent of the recalls written by the middle-aged adults are organized like the original passages. Of the nine that are not, five were organized with a comparison structure after reading the dehydration text in the format of a collection of descriptions. Deleting the data from the five high verbal adults who do not use the structure of the dehydration version presented to them, the order of the means switches from that shown in Table 3 (comparison = 49.67, collection of descriptions = 48.67).

For the old adults, 18 protocols (23%) are organized differently than the original texts. Exclusion of these 18 protocols from the data of the old adults changes the difference between the mean recall for the two discourse types from three points to seven points. The mean for the comparison version increases from 36 to 40. The average recall performance on the nine protocols not following the text structure for the comparison versions is 25. Four average

verbal adults who heard the comparison versions were unable to use it on their recall of both passage topics. The average vocabulary scores of these subjects were lower than their group (Quick = 37, WAIS = 41--scaled score of 10), particularly on the WAIS. These four subjects are actually average verbal according to WAIS norms, and they are performing as we predicted for the average verbal old adults.

After examination of the WAIS vocabulary scores, it is apparent that we failed to obtain an average verbal group of subjects by our screening with the Quick Word Test. As seen in Table 2, subjects who scored low on the Quick (25 percentile) are scoring in the high average (scaled score of 12, 75 percentile) range on the WAIS. As this study compares to past work, the average group in this study is equivalent to the higher groups in past studies. Instead of adding a lower group to examine for all age groups, we added an extremely high group (95 percentile on the WAIS), not previously studied. At this point, we need to collect an average sample as measured by a scaled score of 10 on the Vocabulary Subtest of the WAIS. This is our next step for this investigation.

However, the current data provide some interesting information. One third of the high verbal adults (two young, four middle-aged, and four old) came up with their own comparative structure to organize their protocol when the dehydration text signaled a collection of descriptions. Meyer, Brandt, and Bluth (1980) showed that failure to use the text's top-level structure resulted in poor recall; however, those subjects who used a different structure

employed a listing or collection of descriptions, not a better organized structure as is found with the ten adults in this study. In all of the past studies (see Table 1) with the discourse types of comparison and collection of descriptions, there were no occurrences of spontaneous use of the comparison organization on a text presented with a collection of descriptions structure. The only other investigation (Meyer & Freedle, in press) where switching to other well-organized structures was found occurred on the dehydration passage structured as a problem/solution; a third of these subjects used the problem/solution structure, a third use a causative structure, and the remainder used either a comparison, a collection of descriptions or other structure. The amount of information recalled from the passage was less than expected. The question arises as to whether using a well-organized structure different from the speaker reduces recall under conditions of limited presentation time. That is, does finding a new structure and reorganizing the discourse to fit this new schema take away processing time from storing information?

Relevant to this issue is the performance of the high verbal adults run in this study. The average recall was 44.50 for the ten adults who used a comparative organization on the collection/description text. It was 48.27 for the 19 adults who used the collection of descriptions organization in their recall of the same text. In contrast, the mean was 50.79 for the 28 adults using a comparative structure on a comparative text. Unfortunately, this cursory look at the issue is confounded by the age variable.

Table 4 present these data in greater detail. The data from the young adults would support the idea that restructuring the information to fit a new schema diminishes the storage and recall of facts. Some support is also seen in the data for the old adults, but not the middle-aged adults. Clearly, the few subjects involved in this post-hoc analysis cannot do more than spark interest in further, more rigorous investigations of this issue.

Insert Table 4 about here

Age effects. Most of the subjects who participated in this listening experiment also participated in an experiment where longer passages were read (Meyer & Rice, 1983). In that investigation, age effects in recall were found for the average verbal adults, but not for the high verbal adults. Although the old adults with high vocabulary scores remembered as many ideas and as much of the logic as high scoring young adults, the old adults took longer to read the passages. Middle-aged adults with high verbal ability read the texts as fast as the young adults.

In contrast, in this investigation age effects are found both on the free recall task and in the responses to factual questions. On the dehydration passages, the recall scores were 45.55, 41.34, and 33.95 for the young, middle, and old adults, respectively. A multiple comparisons test revealed that the young differed from the old ($p < .05$), but that the middle-aged group did not differ significantly from either of these age groups. The recall scores

on the whales passages were 48.92, 38.32, and 34.95 for the young, middle, and old adults, respectively; multiple comparison tests showed the young to perform significantly better than both the middle-aged ($p < .05$) and the old adults ($p < .01$), but the middle-aged and old adults did not differ significantly. Scores on the 14 factual questions on dehydration were 8.2, 7.21, and 5.2 for the young, middle, and old adults, respectively. As found with the recall scores for this passage, only the young and old group differed significantly ($p < .01$) when a Tukey Test was used to compare the differences among the means. Also, the data from the questions about whales showed significant differences between the young (10.03) and old (6.83) adults at the .025 level, but the middle-aged adults (8.58) did not differ from either group.

A reasonable explanation for the fact that we found age effects in this study and not in our other study with many of the same subjects focuses on the differing methods of presentation in the two experiments. The controlled presentation time in this study appears to have hurt the free recall performance of the old adults. Cohen (1979) also found age deficits in free recall for old adults when listening to a passage similar to Circle Island (Dawes, 1966) at 120 wpm, the same presentation speed as used in our study. However, at this presentation rate and at 200 wpm for one paragraph descriptions (16, 60, or 75 word messages with one verbatim question per message), Cohen (1979) did not find age effects on verbatim questions.

Clearly our study poses more questions than it answers. First, we must complete the study by collecting data on subjects with average performance on the Vocabulary Subtest of the WAIS to see if we can substantiate the interaction between age, verbal ability, and discourse type indicated in Table 1. Our study dramatically shows the potential difficulties writers will have attempting to write in different ways for different audiences. We tried to write the texts organized as a collection of descriptions to facilitate recall of average verbal adults. However, even with the aid of a vocabulary test for screening participants, we failed to match the text with the capabilities of the learners. The difficulties in the use of different vocabulary tests for matching samples was discussed in Meyer and Rice (1983) and appears to be even more troublesome than we reported earlier.

The data collected replicate the Meyer and Freedle (in press) study with young adults. The comparison structure is superior for facilitating the memory for prose of young adults with high average to high verbal skills. This also appears to be the case for middle-aged and old adults with similar proficient verbal skills. We do not know at this point whether discourse type interacts with verbal ability and age. The completion of this investigation should clarify many of the questions posed by these data.

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Table 1

A Composite of Results from Various Studies Examining the Relationship Between Discourse Type and Learner Characteristics of Age, Vocabulary, and Reading Proficiency

Learner Characteristics (Group Means)		Proportion of Same Information Recalled from Different Discourse Types			
Age	Ability	Comparison		Collection of Descriptions	Study
Old					
80	20% (Nelsen-Denny)	.27	<	.48	Meyer & Walker, Note 2
69	58 (WAIS)	.53	>	.34	Meyer et al., Note 1
66	11.2 (WAIS scaled score)	.48	<	.56	Ellis, 1982
65	Left Brain Damage 11.3 (WAIS)	.27		.27	Ellis, 1982
65	Right Brain Damage 11.4 (WAIS)	.41		.40	Ellis, 1982
Middle					
47	62 (WAIS)	.48	>	.38	Meyer et al., Note 1
Young					
24	77% (Nelsen-Denny)	.57	>	.47	Meyer & Freedle, in press
--	Graduate students	.66	>	.49	Meyer & Freedle, in press
15	High Reading Comprehension Test Scores	.55	>	.46	Brandt, 1978
15	Low Reading Comprehension Test Scores	.25	<	.31	Brandt, 1978
11	Average and Above Reading Comprehension ($\bar{X}$ = 7.3 at sixth grade)	.40 (read twice)	>	.20	Elliott, 1980
		.28 (read once)		.31	Elliott, 1980

Table 2

Descriptors for the Age and Vocabulary Groups

Age Group	Verbal Ability Group	N	Age	Quick Word Test		WAIS Vocabulary Subtest		
				Score	Percentile	Score	Scaled Score	Percentile
Young (18-32)	High	20	23.40 (2.60)[1]	72.90 (8.91)	80%	66.83 (7.22) N = 6	15	95%
	Average	20	23.00 (4.41)	41.25 (8.39)	20%	55.85 (9.88) N = 14	13	84%
Middle (40-54)	High	20	49.65 (3.25)	79.05 (6.64)	90%	69.90 (3.64)	14	91%
	Average	18	47.78 (5.39)	47.33 (6.70)	32%	53.28 (6.78)	11	65%
Old (62+)	High	20	67.47 (4.17)	82.85 (8.59)	93%	75.05 (7.01)	17	99%
	Average	20	69.15 (5.34)	41.75 (8.84)	23%	52.85 (12.59)	12	75%

[1]Means are presented with standard deviations in parentheses.

Table 3

Mean Recall Scores and Standard Deviations Obtained by the Age and Vocabulary Groups for the 81 Identical Idea Units Cast in the Two Discourse Types for Each Topic

		Passage Topic			
		Dehydration		Whales	
Age	Verbal Ability	Comparison	Collection of Descriptions	Comparison	Collection of Descriptions
Young	High	56.00 (6.32)[1]	49.60 (8.25)	55.50 (8.22)	51.70 (8.12)
	Average	41.10 (9.92	35.50 (14.24)	48.00 (8.00)	40.50 (11.79)
Middle	High	48.40 (9.13)	49.20 (10.15)	46.30 (11.90)	42.90 (7.33)
	Average	34.56 (9.80)	31.56 (9.30)	33.56 (12.41)	29.11 (11.38)
Old	High	45.60 (7.26)	41.00 (8.50)	41.70 (10.68)	41.80 (10.21)
	Average	28.10 (12.49)	21.10 (8.03)	29.70 (10.22)	26.60 (8.30)

[1]Means with standard deviations in parentheses.

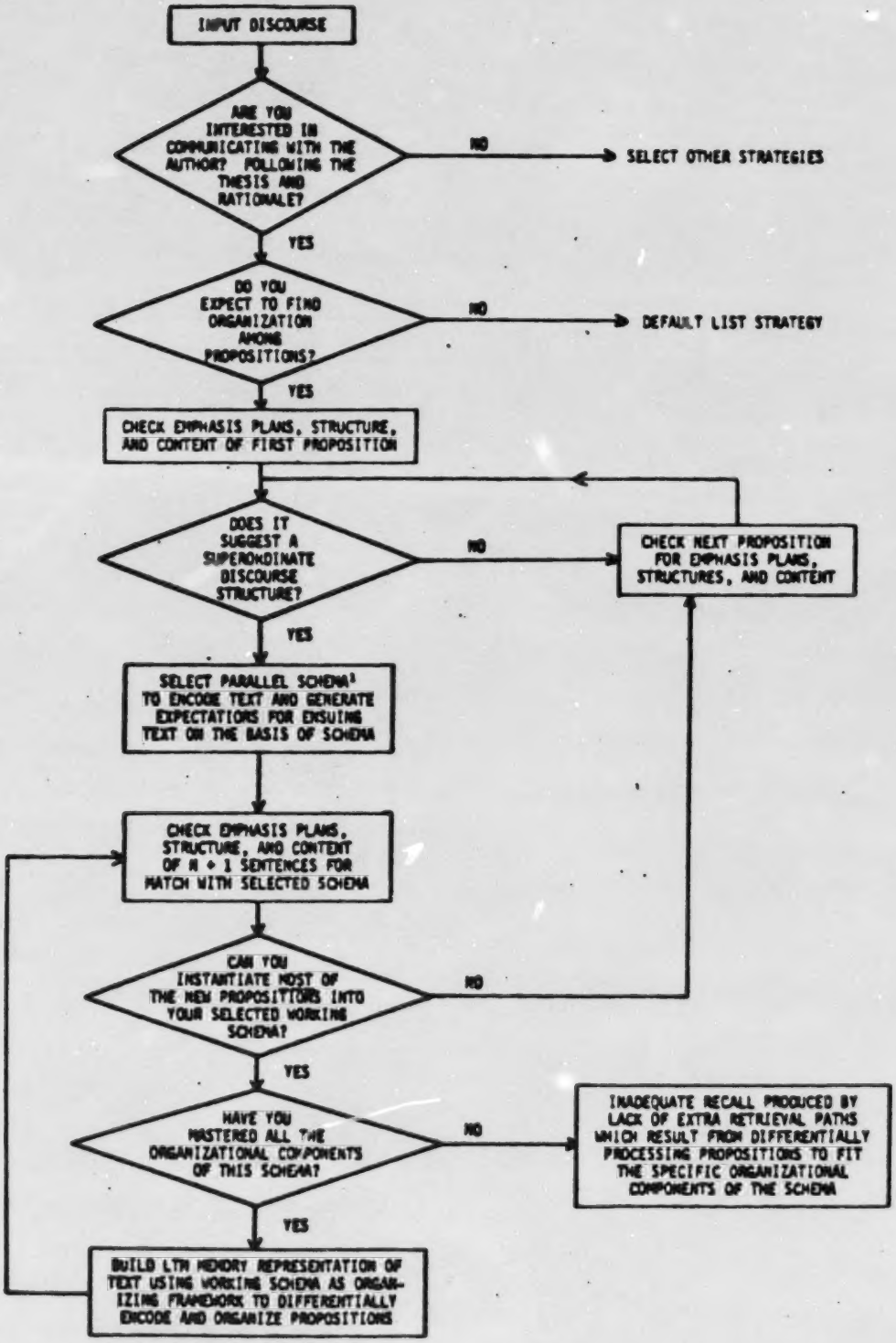
Table 4

Performance on Recall and Questions of High Verbal Adults Who Differed in Their Use of Structure

Age	Task	Use Same Structure as Speaker		Different Structure: Comparison on Collection of Descriptions
		Comparison	Collection of Descriptions	
Young	Free Recall	56.0 (N = 10)	52.0 (N = 8)	42.0 (N = 2)
	Questions	9.0	9.8	6.5
Middle	Free Recall	50.0 (N = 9)	49.0 (N = 6)	50.0 (N = 4)
	Questions	8.7	8.3	9.0
Old	Free Recall	46.0 (N = 9)	42.0 (N = 5)	41.0 (N = 4)
	Questions	6.9	7.8	6.0

Figure Caption

Figure 1. Model for getting text information into organized schemata for storage in memory (from Meyer & Freedle, in press).


INPUT DISCOURSE
ARE YOU INTERESTED IN COMMUNICATING WITH THE AUTHOR? FOLLOWING THE THESIS AND RATIONALE?
NO
SELECT OTHER STRATEGIES
YES
DO YOU EXPECT TO FIND ORGANIZATION AMONG PROPOSITIONS?
NO
DEFAULT LIST STRATEGY
YES
CHECK EMPHASIS PLANS, STRUCTURE, AND CONTENT OF FIRST PROPOSITION
DOES IT SUGGEST A SUPERORDINATE DISCOURSE STRUCTURE?
NO
CHECK NEXT PROPOSITION FOR EMPHASIS PLANS, STRUCTURES, AND CONTENT
YES
SELECT PARALLEL SCHEMA[1] TO ENCODE TEXT AND GENERATE EXPECTATIONS FOR ENSUING TEXT ON THE BASIS OF SCHEMA
CHECK EMPHASIS PLANS, STRUCTURE, AND CONTENT OF N + 1 SENTENCES FOR MATCH WITH SELECTED SCHEMA
CAN YOU INSTANTIATE MOST OF THE NEW PROPOSITIONS INTO YOUR SELECTED WORKING SCHEMA?
NO
YES
HAVE YOU MASTERED ALL THE ORGANIZATIONAL COMPONENTS OF THIS SCHEMA?
NO
INADEQUATE RECALL PRODUCED BY LACK OF EXTRA RETRIEVAL PATHS WHICH RESULT FROM DIFFERENTIALLY PROCESSING PROPOSITIONS TO FIT THE SPECIFIC ORGANIZATIONAL COMPONENTS OF THE SCHEMA
YES
BUILD LTM MEMORY REPRESENTATION OF TEXT USING WORKING SCHEMA AS ORGANIZING FRAMEWORK TO DIFFERENTIALLY ENCODE AND ORGANIZE PROPOSITIONS

[1]Type of schema selected here influences processes of selection and buffer rehearsal.